

AMENDMENT

In the Claims

Please cancel claims 126-128 without prejudice.

Please amend claims 97, 103, 106, and 113 as shown below. For convenience of prosecution, all pending claims are shown below in accordance with the revised format of amendments.

88. (Previously Amended) A tunable optical filter apparatus, comprising:

a grid generator to be positioned in an optical path of an optical signal and to generate a first plurality of transmission peaks at respective wavelengths corresponding to optical communication channels within a selected wavelength range; and

a channel selector to be positioned in said optical path to be optically coupled to the grid generator and to generate a second plurality of transmission peaks at respective wavelengths within said wavelength range, said channel selector including means for tuning the second plurality of transmission peaks relative to the first set of transmission peaks such that a single pair of respective transmission peaks from among the first and second plurality of transmission peaks having a common wavelength may be aligned,

wherein the tunable optical filter enables a portion of the optical signal having a wavelength corresponding to the common wavelength of the aligned transmission peaks to pass through while substantially attenuating portions of the optical signal having other wavelengths.

89. (Previously Amended) The apparatus of claim 89, wherein said grid generator has a first free spectral range and said channel selector has a second free spectral range different from said first free spectral range, and wherein tuning is effectuated by shifting the second plurality of transmission peaks relative to the first plurality of

transmission peaks to align one of the transmission peaks from the second plurality of transmission peaks with a transmission peak from the first plurality of transmission peaks having a wavelength corresponding to a selected channel.

90. (Previously Cancelled) The apparatus of claim 90, further comprising a gain medium optically coupled to the grid generator, to emit an optical beam along said optical path and receive optical feedback from said grid generator and said channel selector] corresponding to the selected channel .

91. (Previously Amended) The apparatus of claim 88, wherein at least one of said grid generator and said channel selector is configured to operate in transmission.

92. (Previously Amended) The apparatus of claim 88, wherein at least one of said grid generator and said channel selector is configured to operate in reflection.

97. (Currently Amended) A method for tuning an optical beam, comprising:

- generating a first plurality of transmission peaks having respective wavelengths corresponding to channels within a selected wavelength range;
- generating a second plurality of transmission peaks having respective wavelengths within said selected wavelength range; and
- tuning said second plurality of transmission peaks with respect to said first plurality of transmission peaks to tune said optical beam to a selected channel by aligning one of the second plurality of transmission peaks with one of the first plurality of transmission peaks corresponding to the selected channel.

98. (Previously Amended) The method of claim 97, wherein:

generating said first plurality of transmission peaks comprises positioning a grid generator having a first free spectral range in said optical beam; and
generating said second plurality of transmission peaks comprises positioning a channel selector having a second free spectral range in said optical beam.

99. (Previously Amended) The method of claim 98, wherein tuning said second plurality of transmission peaks with respect to said first plurality of transmission peaks comprises adjusting said second free spectral range with respect to said first spectral range.

101. (Previously Amended) A tunable optical filter apparatus for filtering an optical beam, comprising:

grid means for generating a first plurality of transmission peaks having respective wavelengths corresponding to channels in a selected wavelength range, said grid means to be positioned in an optical path for said optical beam; and

channel selector means for generating a second plurality of transmission peaks having respective wavelengths, said channel selector means to be positioned in said optical path to be optically coupled to the grid means and to tune the optical beam by aligning one of the second plurality of transmission peaks with one of the first plurality of transmission peaks.

102. (Previously Added) The apparatus of claim 88, wherein the first plurality of transmission peaks have a constant free spectrum range and the second plurality of transmission peaks have a variable free spectrum range and tuning is effectuated by adjusting the variable free spectrum range of the second plurality of transmission peaks

to align one of the transmission peaks from the second plurality of transmission peaks with a transmission peak from the first plurality of transmission peaks having a wavelength corresponding to a selected channel.

103 (Currently Amended) The ~~method~~ apparatus of claim 88, wherein tuning said second plurality of transmission peaks with respect to said first plurality of transmission peaks comprises shifting said second plurality of transmission peaks relative to said first plurality of transmission peaks.

104. (Previously Added) The apparatus of claim 88, wherein the grid generator defines a first optical path length determinative of a first free spectral range substantially corresponding to a spacing between adjacent gridlines of the selected wavelength grid.

105. (Previously Added) The apparatus of claim 104, wherein the channel selector defines a second tunable optical path length determinative of a second tunable free spectral range which differs from the first free spectral range of the grid generator by an amount substantially equal to the quotient of the first free spectral range divided by one of a number of channels of the selected wavelength grid or the quotient of the first free spectral range divided by a subset of the number of channels of the selected wavelength grid.

106. (Currently Amended) The apparatus of claim 88, wherein the grid generator and the channel selector comprise at least one of: a Fabry-Perot filter, a diffraction element, and an interference element, ~~and a birefringence element.~~

107. (Previously Added) The apparatus of claim 88, wherein the channel selector includes at least one of: a Pockels cell, a Kerr cell, a solid etalon, a gap etalon, and a wedge-shaped etalon.

108. (Previously Added) The apparatus of claim 88, wherein the channel selector includes at least one of a tunable length and a tunable index of refraction.

109. (Previously Added) The apparatus of claim 88, wherein the tuning of the channel selector is effected by one of: a mechanical actuator, a thermal actuator, an electro-optical actuator, and a pressure actuator to tune the second plurality of transmission peaks.

110. (Previously Added) The apparatus of claim 88, wherein the channel selector comprises:

a gas spaced etalon tunable by adjusting a pressure of a gas within the etalon to vary an optical path length thereof.

111 (Previously Added) The apparatus of claim 88, wherein the channel selector comprises:

an etalon responsive to an applied electric field to vary an optical path length thereof.

112. (Previously Added) The apparatus of claim 88, wherein the channel selector comprises:

an etalon responsive to an applied thermal energy to vary an optical path length thereof.

113. (Currently Amended) The apparatus of claim ~~88~~ 108, wherein the channel selector comprises:

a semiconductor element with a tunable index of refraction responsive to an applied electric field or current to vary an optical path length thereof.

114. (Previously Added) The apparatus of claim 88, wherein the channel selector comprises:

a grating; and

an actuator for varying an angle between the grating and the optical beam to tune the optical beam to selected channels of the wavelength grid.

115. (Previously Added) The tunable laser of claim 88, wherein the grid generator comprises:

an etalon; and

a thermal controller to control a temperature of the etalon to maintain the substantial alignment of the first set of transmission peaks with the corresponding channels of the selected wavelength grid.

116. (Previously Added) A method for tuning an optical beam, comprising:

filtering the optical beam to define a first plurality of pass bands substantially aligned with corresponding channels in a selected wavelength grid having a wavelength range;

filtering the optical beam to define a second plurality of pass bands within the selected wavelength grid; and

tuning the second plurality of pass bands with respect to the first plurality of pass bands to select channels at which to tune the optical beam, wherein the optical beam is tuned to a channel when one of the pass bands in the second plurality of pass bands is

aligned with a pass band in the first plurality of pass bands corresponding to a selected channel.

117. (Previously Added) The method of claim 116, further comprising:
emitting the optical beam via a gain medium; and
optically providing feedback to the gain medium corresponding to the pass bands of the first and second plurality of pass bands that are aligned.

118. (Previously Added) The method of claim 116, wherein the tuning further comprises:
shifting the second set of pass bands across a wavelength range substantially equal to one channel spacing within the wavelength grid to tune channels throughout the selected wavelength grid.

119. (Previously Added) The method of claim 116, wherein the tuning further comprises:
defining selectable channels by selecting either subsets of channels throughout the wavelength grid or discrete channels throughout the wavelength grid.

120. (Previously Added) The method of claim 116, wherein the filtering the optical beam to define a first set of pass bands comprises:
generating a first interference within the optical beam with a first free spectral range subsequently corresponding to a wavelength spacing for the selected wavelength grid.

121. (Previously Added) The method of Claim 120, wherein the filtering the optical beam to define a second set of pass bands comprises:

generating a second interference within the optical beam with a second free spectral range which differs from the first free spectral range by an amount substantially equal to the quotient of the first free spectral range divided by one of a number of channels of the selected wavelength grid or the quotient of the first free spectral range divided by a subset of the number of channels of the selected wavelength grid.

122. (Previously Added) The method of claim 116, wherein the first plurality of pass bands have transmission peaks defining a first free spectrum range and the second plurality of pass bands have transmission peaks defining a second free spectrum range and tuning is accomplished by shifting the second plurality of pass bands relative to the first plurality of pass bands to align one of the transmission peaks from the second plurality of pass bands with a transmission peak from the first plurality of pass band having a wavelength corresponding to the selected channel.

123. (Previously Added) The method of claim 116, wherein the first plurality of pass bands have transmission peaks defining a first constant free spectrum range and the second plurality of pass bands have transmission peaks defining a second free spectrum range that may be varied, and tuning is accomplished by adjusting the second free spectrum range to align one of the transmission peaks from the second plurality of pass bands with a transmission peak from the first plurality of pass bands having a wavelength corresponding to the selected channel.

124. (Previously Added) The apparatus of claim 101, wherein the first plurality of transmission peaks have a first free spectrum range and the second plurality of transmission peaks have a second free spectrum range and the channel selector means includes:

means for shifting the second plurality of transmission peaks relative to the first plurality of transmission peaks to align one of the transmission peaks from the second plurality of pass bands with a transmission peak from the first plurality of pass band having a wavelength corresponding to a selected channel.

125. (Previously Added) The apparatus of claim 101, wherein the first plurality of transmission peaks have a first constant free spectrum range and the second plurality of transmission have a second free spectrum range that may be varied, and the channel selection means includes:

means for adjusting the second free spectrum range to align one of the transmission peaks from the second plurality of transmission peaks with a transmission peak from the first plurality of transmission peaks having a wavelength corresponding to a selected channel.

126. (Currently Cancelled) A communication apparatus, comprising:

a first optical circulator having a first port for receiving an input optical beam, a second port from which a filtered portion of the input optical beam is emitted, and a third port from which a non-filtered portion of the input optical beam is emitted; and

a tunable filter including:

a grid generator positioned in an optical path of the filtered portion of the optical beam and configured to generate a first plurality of transmission peaks corresponding to channels within a selected wavelength grid;

a channel selector positioned in the optical path and configured to generate a second plurality of transmission peaks within a wavelength range corresponding to the selected wavelength grid; and

a second optical circulator, disposed in the optical path downstream of the tunable filter, having a first port for receiving an optical beam passing through the

tunable filter, a second port from which an output optical beam is emitted, and a third port coupled to the third port of the first optical circulator to receive the non-filtered portion of the input optical beam,

said tunable filter to tune to a selected channel from among channels defined by the selected wavelength grid, said filtered portion of the input optical beam having a wavelength corresponding to the selected channel.

FI
and
127. (Currently Cancelled) The apparatus of claim 126, wherein the channel selector comprises a channel tuner operatively coupled to an optical element to control an optical characteristic of the optical element to generate the second plurality of transmission peaks.

128. (Currently Cancelled) The apparatus of claim 127, wherein the grid generator includes a grid controller operatively coupled to an optical element to control an optical characteristic of the optical element to generate the first plurality of transmission peaks.
